

CLAIMS

What is claimed:

1. A piston cylinder unit comprising:

a closed cylinder having an end wall;

a piston rod guided through said end wall;

a piston fixed to said piston rod for axial displacement in said cylinder, said piston dividing said cylinder into a working space surrounding the piston rod and a working space away from the piston rod;

an annular seal between said piston and said cylinder;

a volume equalizing space in said piston;

a first valve which can be opened under pressure to admit fluid from said working space away from said piston rod to said volume equalizing space,

a second valve which can be opened under pressure to admit fluid from said working space surrounding said piston rod to said volume equalizing space,;

a first non-return valve which can admit fluid from said volume equalizing space to said working space away from said piston rod; and

a second non-return valve which can admit fluid from said volume equalizing space to said working space surrounding said piston rod.

2. A piston-cylinder unit as in claim 1 wherein said volume equalizing chamber has a fluid capacity which increases under pressure loading and decreases under pressure relief.

1 3. A piston-cylinder unit as in claim 2 further comprising a volume-
2 equalizing element in said volume-equalizing chamber, said element having a volume
3 which decreases under pressure loading and increases under pressure relief.

1 4. A piston-cylinder unit as in claim 3 wherein said volume equalizing
2 element has an elastomeric wall enclosing a space filled with a gas.

1 5. A piston-cylinder unit as in claim 1 wherein at least one of said
2 valves which can be opened under pressure is a non-return valve which is loaded in a
3 closing direction by a closing force.

1 6. A piston-cylinder unit as in claim 5 wherein said at least one of said
2 valves which can be opened under pressure comprises a closing element which is
3 loaded in a closing direction by one of a helical compression spring and a cup-type
4 compression spring.

1 7. A piston-cylinder unit as in claim 5 wherein at least one of said
2 valves which can be opened under pressure is a seat valve.

1 8. A piston-cylinder unit as in claim 5 wherein at least one of said
2 valves which can be opened under pressure is a slide valve.

1 9. A piston-cylinder unit as in claim 5 wherein said at least one of said
2 valves which can be opened under pressure comprises a valve chamber in said piston
3 and a valve piston bearing a closing element in said chamber, said valve piston being

4 loaded in said closing direction by said closing force and acted upon in an opening
5 direction by pressure in a respective at least one of said working spaces.

1 10. A piston-cylinder unit as in claim 9 wherein one of said closing
2 element and said valve piston of said at least one of said valves is loaded in the closing
3 direction by a spring.

1 11. A piston-cylinder unit as in claim 1 wherein said spring comprises
2 one or more spring arms supported on the piston and applying a force which is
3 degressive so that said closing element is subject to less force in a closing direction as
4 said closing element moves in an opening direction.

1 12. A piston-cylinder unit as in claim 9 wherein one of said closing
2 element and said valve piston of said at least one of said valves is loaded in the closing
3 direction by magnetic forces.

1 13. A piston-cylinder unit as in claim 12 wherein said at least one of
2 said valves which can be opened under pressure comprises a permanent magnet on
3 one of said valve piston and said piston and a ferromagnetic component on the other of
4 said valve piston and said piston.

1 14. A piston-cylinder unit as in claim 9 wherein said at least one of said
2 valves which can be opened under pressure is retained in an open position by a
3 retaining force which is smaller than said closing force, said retaining force added to
4 said pressure being larger than said closing force.

1 15. A piston-cylinder unit as in claim 14 further comprising a latching
2 element on one of said valve piston and said piston, and a latch on the other of said
3 valve piston and said piston, said latching element and said latch providing said
4 retaining force.

1 16. A piston-cylinder unit as in claim 14 further comprising a snap
2 spring arranged on the valve piston, said snap spring having a snap arm which is
3 contact with said piston without any substantial axial force in the closed position, and
4 cooperates with said piston to provide said retaining force in the open position.

1 17. A piston-cylinder unit as in claim 9 further comprising at least one
2 permanent magnet arranged on said valve piston and at least one permanent magnet
3 arranged on said piston, said permanent magnets being arranged to provide said
4 closing force when said valve piston is in a closed position and said retaining force
5 when said valve piston is in an open position.

1 18. A piston-cylinder unit as in claim 1 wherein said annular seal is
2 designed to form said first and second non-return valves.

1 19. A piston cylinder unit as in claim 18 wherein said annular seal
2 comprises two axially spaced annular sealing lips which bear against said cylinder and
3 form a space therebetween, said piston comprising a connecting line which connects
4 said volume-equalizing chamber to said space between said annular sealing lips.

1 20. A piston-cylinder unit as in claim 18 wherein said annular seal
2 comprises two axially spaced valve flaps separated by a sealing ring which bears
3 elastically against said cylinder, said piston comprising a pair of connecting lines which
4 open radially on said piston and lead to the volume-equalizing chamber, said valve flaps
5 closing respective said connecting lines.